POTENTIAL ENDOCRINE DISRUPTION AND CHRONIC TOXICITY OF SEDIMENT−ASSOCIATED CONTAMINANTS ON CRITICAL AQUATIC SPECIES IN SUISUN MARSH

Swee Joo Teh

Public Comments

No public comments were received for this proposal.

Collaboration Panel Review

Proposal Title

#0044: POTENTIAL ENDOCRINE DISRUPTION AND CHRONIC TOXICITY OF SEDIMENT−ASSOCIATED CONTAMINANTS ON CRITICAL AQUATIC SPECIES IN SUISUN MARSH

Final Panel Rating
adequate

Collaboration Panel (Primary) Review

Collaboration:

Will the results of the collaborative effort be greater than the sum of its parts? Is it clear why the subprojects are part of a larger collaborative proposal rather than several independent smaller ones?

inadequate
The general collaboration is to "integrate and develop comparative and interpretive information in conjunction with the Montezuma Wetland project and longterm Suisun Marsh monitoring projects." Different data sets collected within the study are treated as subprojects.

Interdependence And Integration:

Does the proposal have an example that clearly articulates the conceptual model of each subproject and how they link together as a whole? Are the boundaries of the study plans focused and cohesive, yet well delineated? Is there a plan for potential differences in the stages of subproject completion times? Are there clear plans for analyses and interpretations which seek to identify and quantify relationships among the data collected in various subprojects rather than separate analyses for each subproject?

inadequate
In terms of collecting different data sets, the plan is adequate. Larger collaboration with other groups is not well developed.

Project Management:

Is it clear who will be performing management tasks and administration of the project? Are there resources set aside for project management and time given for investigators to collaborate? Is there a process for making decisions during the course of the project? Are there acknowledgments of potential barriers to collaboration and explanations of how team members will overcome barriers particular to their institutions?

inadequate
Management and administration are along the lines of managing the method and procedure of data collection and analysis and tracking progress through reporting. Final publication of results is the lead investigator's job. No meetings are planned and no process for decision−making is identified. No barriers are stated.

Team Composition:

Does the lead principal investigator have successful management history and experience leading collaborative teams? Is it clear that all key personnel are committed to making significant contributions to the project? Do team members have complementary skills?

adequate
The lead investigator has no stated experience in managing collaborative efforts beyond what is expected for collaborating with researchers in related fields. The key personnel are committed to their contributions and have complementary skills within related fields.

Communication Of Results:

Is there a clear plan for comprehensive and cohesive reporting of project progress to the CALFED community?

adequate
Plans for journal papers, presentations, and the like are expected.

Additional Comments:

Collaboration Panel (Discussion) Review

Secondary considers that most of the categories are adequate. The applicants do have a conceptual model to link the various elements of the proposed study. They have conceptual models for subprojects and an overarching conceptual model. There is not a plan to account for differences in completion times of sub−projects. The management structure and mechanisms are adequate. Team composition is adequate and the budget breakdown has adequate detail. They plan to use the standard methods for communicating their results.

Primary agrees.

Technical Synthesis Panel Review

Proposal Title

#0044: POTENTIAL ENDOCRINE DISRUPTION AND CHRONIC TOXICITY OF SEDIMENT−ASSOCIATED CONTAMINANTS ON CRITICAL AQUATIC SPECIES IN SUISUN MARSH

Final Panel Rating
adequate

Technical Synthesis Panel (Primary) Review

TSP Primary Reviewer's Evaluation Summary And Rating:

The proposal is well written, the experimental plan seems well planned and feasible, and the results are likely to inform the process of restoration of the Suisun Marsh. Preliminary information on the extent of contamination of the sediments would have been useful, as the study depends on said contamination for its feasibility. The PI is well qualified and the team seems appropriate to the task.

Additional Comments:

The proposal is well written, the experimental plan seems well planned and feasible, and the results are likely to inform the process of restoration of the Suisun Marsh. Preliminary information on the extent of contamination of the sediments would have been useful, as the study depends on said contamination for its feasibility. The PI is well qualified and the team seems appropriate to the task.

Technical Synthesis Panel (Discussion) Review

TSP Observations, Findings And Recommendations:

The panel acknowledged the substantial conflict among external reviewers on this proposal. The panel believed that the proposal had significant technical shortcomings. These emanated from problems in experimental design and from some perceived shortcomings in incorporating background natural history of the benthic organisms to be studied. For example, the proposal confused the goal of establishing baseline conditions for sediment/benthic contaminant levels with studies of the dose−response curves to these contaminants. There is insufficient pre−treatment/post−treatment comparison to establish a mortality response. The panel felt that the external review with the lowest rating was a more thoughtful and thorough review than the other two, more positive, reviews; thus the panel rated the proposal “adequate”.

Technical Review #1

proposal title: POTENTIAL ENDOCRINE DISRUPTION AND CHRONIC TOXICITY OF SEDIMENT−ASSOCIATED CONTAMINANTS ON CRITICAL AQUATIC SPECIES IN SUISUN MARSH

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**The project goals, objectives, and hypotheses are stated very clearly. The authors list five specific goals, and subsequently present a conceptual model and propose four hypotheses. The goals and ideas are timely and supported by the needs of a changing estuary. The proposed work appears to closely fit with target issues identified by CALFED.**
Rating	**very good**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**The proposed study is a very broad and yet properly focused set of field and laboratory experiments that would provide a baseline and valuable tools for determining the potential endocrine modulating effects of hydrological, chemical, and biological changes. The results would add significantly to the existing knowledge in both a general, scientifically valuable sense, as well as in an area−specific and locally−applicable context. The conceptual models are**

	clearly stated and provide a consistent theme to the proposal. The scope of the project is ambitious, but the scale is appropriate to the needs.
Rating	**very good**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**The approach is complex and multidisciplinary, and appears to be sound in all areas. As I stated above, the results will most certainly add to the base of knowledge and will generate novel information, though the experimental approaches themselves are mostly based on existing methodologies. The approach is clearly explained and further illustrated in useful flowcharts (Figures 1 through 6). The information would be very useful to decision makers as wetland restoration projects change conditions in the Suisun Marsh area, and would establish biomarkers to be used by other researchers.**
Rating	**very good**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**Although very ambitious, the project is technically feasible and is well documented in the proposal. The likelihood of success is high. My main concerns lie in two areas:** **1) Take permits. The authors state that they have tried to minimize fish take, but to the best of my**

	understanding, the take appears very large (between 500 and 1,000 adult splittail under task 2−2). **2) Establishing LC50 using field−collected sediments. If the presence of sediments containing lethal levels of pollutants to clams is not known a priori, the authors may or may not be able to establish an LC50 if the contaminant concentrations in un−spiked sediments are too low.** **Both of these concerns could be resolved with additional explanation.**
Rating	**very good**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**The laboratory procedures, SOPs, and QA/QC protocols appear to be well established. The authors will rely to some extent on existing RMP SOPs, making the study fully compatible with ongoing monitoring efforts. However, the authors do not discuss statistical methods that would be used to analyze this very large dataset.** **Under task 2, the authors state that the sampling for benthic invertebrates and sediment will occur "yearly for three years", but do not state when (in which season, tidal stage) this sample collection will occur. There can be significant influence of seasonal cycles on sediment quality and I am concerned that these variations will not be accounted for. Furthermore, the authors do not state where in the channels (depth, flow regime) the sediment samples will be collected, though perhaps these details are specified in the referenced RMP**

	Field Sampling Manual.
Rating	**good**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	**The products of this research would likely be of great value to environmental management of this habitat. Although not explicitly described in the proposal, the research could result in contributions to data management systems. The authors will need to develop a strategy, possibly statistically-based, to resolve potential conflicting findings.**
Rating	**very good**

Additional Comments

Comments	**The authors do not explicitly discuss which contaminants will be analyzed under Task 2. In the Project Purpose section, a list of common potential pollutants is presented. However, a list of analytes is not shown. The authors propose to analyze and consider only bulk sediment chemistry, even though metal bioavailability is dependent on metal speciation and association on soil/sediment.** **I recommend the authors explicitly list and justify the pollutants which will be considered. In the absence of such a list, one is forced to assume that "all" potential contaminants will be analyzed for, which is unlikely. I also recommend determining, on a subset of samples, metal bioavailability using one of the established leaching procedures.**

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**The PI, primary and secondary staff, and the subcontractors all have good to excellent track records and are well suited to perform the assigned tasks. The team is multi−disciplinary and multi−institutional, providing a great breadth of knowledge and experience. The laboratory facilities described in the proposal appear to be well−equipped and of high quality.**
Rating	**very good**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**This is a complex, three−year project with a substantial budget, that may be reasonable for the proposed work. However, it is difficult to evaluate because there is insufficient detail provided under certain tasks and subtasks.** **The budget for task 2−1 is $473K, or approximately 1/3 of the total proposed budget, and yet most of this dollar figure ($413K) is justified by only two line items, listing the total annual amounts for two subcontractors. Unlike under other tasks, neither hours nor hourly costs are specified. Assuming an hourly cost of $50, the labor costs for J. Hayworth amount to nearly 75% employment for three years, for a task which, based on the description in the proposal, involves a once−per−year collection of sediments and benthic fauna. This seems excessive, but cannot be evaluated without more detail. It should be noted that this is already in addition to almost 400 labor hours**

	budgeted for other team members, who will presumably be involved in sample collection. **Similarly, the budget for Hamilton Coreen for analytical services is not justified based on hours nor on a certain number or types of analyses. This effort seems misplaced in the budget table, since there is no mention of sample analysis under the Task 2−1 description. Again, due to a lack of detail, it is difficult to evaluate whether an annual budget of nearly $70,000 is appropriate for the organic analysis alone.** **Since the total analytical costs of the proposed work are probably in the half−million−dollar−range, I think the proposal should include a table listing the types and numbers of analyses.**
Rating	**fair**

Overall

Provide a brief explanation of your summary rating.

Comments	**The proposed work is ambitious, timely, and significant. The proposal is generally well−written. The goals, approach, methods, and products are clearly−presented. I believe this work would be an important contribution to both scientific knowledge and area−specific needs.** **The authors should provide more detailed justification for the costs of each task, and especially costs related to Task 2−1 specifically, and analytical work in general.**
Rating	**very good**

Technical Review #2

proposal title: POTENTIAL ENDOCRINE DISRUPTION AND CHRONIC TOXICITY OF SEDIMENT−ASSOCIATED CONTAMINANTS ON CRITICAL AQUATIC SPECIES IN SUISUN MARSH

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**Goals and objectives are clearly stated and internally consistent. There are two components of the overall goal (establishing baseline data for two indicators of water and sediment quality conditions in Suisun Marsh; benthic community assemblages and Sacramento splittail). While the fish (splittail) side of the proposal is very well developed in the proposal, the component dealing with benthic community assemblages is not. The timeliness and importance of the research is partly tied to targeted restoration actions in the Suisun Marsh complex, and the fact that the Sacramento splittail is a native at−risk species. However, the restoration (the Montezuma Restoration Project MRP) is situated adjacent to Suisun Marsh and it is not clear that MRP will affect Suisun Marsh.**
Rating	**very good**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**The study hinges on the assumption that there is significant sediment contamination in Suisun Marsh.**

	The proposal states that the current condition of sediments within the marsh is largely unknown, and mentions limited studies showing elevated contaminant levels in sediment and organisms on the marsh perimeter. No information is provided from the currently ongoing "Montezuma wetland project and currently funded long−term Suisun Marsh monitoring projects". This means that sediment contamination may not be an issue here (i.e. contaminant levels may not be elevated at the proposed collections sites). It is not clear to what extent the research will overlap with the MRP's sampling of Suisun Marsh. It also seems that the MRPis already collecting some baseline data in Suisun Marsh, negating part of the justification for the proposed study.
Rating	**fair**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**The approach is, in general, well designed and appropriate for meeting the objectives of the project. Studying the effects of Suisan Marsh sediment on splittail at various levels (tissue burdens and various biomarkers in field−collected fish, toxicity and sublethal effects on larvae exposed in the lab, trophic transfer from clams to the splittail) is a strong component of the proposal. In contrast, the approach for studying the effects of the marsh sediment on the benthic invertebrate community is relatively weak. It consists of a once−yearly sampling of the benthic community at the 12 sites, and of laboratory exposures (to field−collected sediments) of clams. It is not clear why the authors have decided to use Corbicula flumina rather than P. amurensis (the species that has been shown to be consumed by**

	splittail). While both are filter feeders, they may nevertheless differ in contaminant accumulation , detoxification, etc.
Rating	**good**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**In general, the approach is fully documented and technically feasible. But it is not clear whether the research will be successful in establishing baseline data for benthic community assemblages. For example, hypothesis 1 states that "benthic community structure will be different along a gradient of salinity and sediment contamination", but separating the influences of salinity and sediment contamination (with sampling sites located as they are: mostly along the length of Montezuma Slough) will be complicated at best. No details are given on statistical approaches aimed at achieving this. In general, the scale of the project is consistent with the objectives and within the grasp of the authors. One minor problem could be the analysis of metallothionein levels in the fish; the proposed method (differential pulse polarographic method) is not widely used and probably not the best way to look for differences in metallothionein levels among fish. The investigators appear to have very limited experience with metallothionein analyses.**
Rating	**good**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**Not applicable to this proposal.**

Rating	**very good**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	**This research could produce products of value, especially with respect to information about the effect of sediment contamination on the Sacramento splittail. As indicated previously, this hinges on there actually being elevated contaminant levels in Suisun Marsh sediment.**
Rating	**very good**

Additional Comments

Comments	**(none)**

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**The author of the proposal seems to have a very solid track record of funding and publication. The project team seems generally well suited for implementing the proposed project. It appears that two scientists (a histopathologist and a molecular biologist) still need to be identified, so that their direct fit can not be evaluated.**
Rating	**very good**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**The total for task 2−1 “Benthic Invertebrate Community, Clams and Sediment Collections” seems very high at almost 500K. However, it seems that the entire subcontract for organic contaminant analyses was placed under this task. And costs for “expendables” under tasks 3−2 and 4 seem high (a combined 51K). The overall budget seems on the high end.**
Rating	**good**

Overall

Provide a brief explanation of your summary rating.

Comments	**This is generally a strong proposal. However, it is hampered by the lack of sufficient background data confirming contamination of Suisun Marsh (which maybe should have been collected in a small−scale pilot study) and the inclusion of the poorly developed component dealing with the benthic community assessment.**
Rating	**good**

Technical Review #3

proposal title: POTENTIAL ENDOCRINE DISRUPTION AND CHRONIC TOXICITY OF SEDIMENT−ASSOCIATED CONTAMINANTS ON CRITICAL AQUATIC SPECIES IN SUISUN MARSH

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**Are the goals, objectives and hypotheses clearly stated and internally consistent? Yes, the goals are consistent, and this is a hypothesis−driven proposal. It is also extremely ambitious, assessing not only the field conditions, but simulating field conditions in the laboratory.** **Is the idea timely and important? This is an extremely timely proposal, especially given the potential of EDCs in the sediments to bioaccumulate to a sensitive fish species (splittail) and to impact this species' offspring. Also, a nearby marsh is undergoing restoration, with the two wetland systems to be ultimately linked. This data will provide critical baseline data for the ongoing restoration project.**
Rating	**excellent**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**Is the study justified relative to existing knowledge? There is enough preliminary data to justify this**

	study. Indeed, this is an important next step in assessing the biological impact of sediment−associated EDCs, and will follow nicely from some prior CALFED projects. **Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Yes, the conceptual model is clearly stated and also clearly illustrated in the various Figure attachments.** **Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified? There is enough preliminary data to justify a full−scale implementation of this project.**
Rating	**excellent**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**Is the approach well designed and appropriate for meeting the objectives of the project? The approach is extremely well designed. It may be quite difficult logistically to perform the large number of clam and fish studies, but the authors seem to be well qualified to perform these tasks.** **Is the approach feasible? Yes, the approach is feasible.** **Are results likely to add to the base of knowledge? The results will be very important, especially in differentiating between bioaccumulation from the food chain (via clams) or direct accumulation from the sediment (in early life−stages of the splittail). In addition, assessing the benthic community structure,**

	chemical composition of the sediments, and tissue burdens of chemicals will help tie together disparate parts of this proposal. **Is the project likely to generate novel information, methodology, or approaches? This project will definitely generate novel information. In addition, one of the post−doc fellows will attempt to develop molecular techniques for some of the standard biochemical markers. This could lead to new method development, but is not crucial for the success of this proposal.** **Will the information ultimately be useful to decision makers? Yes, this information will be useful to decision makers, especially as remediation of nearby wetland areas progresses.**
Rating	**excellent**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**Is the approach fully documented and technically feasible? Yes, this approach is fully documented and technically feasible.** **What is the likelihood of success? Very high.** **Is the scale of the project consistent with the objectives and within the grasp of authors? This project is very ambitious, but the authors seem capable of completing the proposal in a timely and quality manner.**
Rating	**excellent**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? The monitoring is appropriately designed, with the proper controls and pre/post comparisons.** **Are there plans to interpret monitoring data or otherwise develop information? Yes, there are plans to share the data created in this proposal, and it will be extremely useful, especially as remediation of surrounding wetlands takes place. Using the chemical composition data and the biomarker data will help elucidate mechanisms of action.**
Rating	**excellent**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	**Are products of value likely from the project? Yes, including bioaccumulation/ biomagnification data, and a better understanding of changes in benthic community structure dependent not only on salinity gradients, but also on contaminant gradients.** **Are contributions to larger data management systems relevant and considered? Yes, this data will be shared and will be useful to decision−makers and planners in the future.** **Are interpretive (or interpretable) outcomes likely from the project? Yes, this study is well designed with proper controls and laboratory−to−field**

	simulations. This will go beyond correlations to assess specific biochemical end points and determine mechanisms of action in the laboratory.
Rating	**excellent**

Additional Comments

Comments	**Overall, this proposal is extremely ambitious, but the team of scientists involved have the ability to complete this tremendous project. This is a very well−designed study, and will take an incredible amount of logistical coordination. The outcome will be extremely useful, especially as remediation is in progress in nearby wetlands.**

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**What is the track record of authors in terms of past performance? The authors are well−qualified and experts in their fields. They have successfully cultured the fish and clams in their laboratories, and have been working with these species for quite some time. The histological, biochemical, and molecular endpoints are all within the expertise of these authors.** **Is the project team qualified to efficiently and effectively implement the proposed project? Yes, this is an impressive team which can efficiently and effectively implement this project.** **Do they have available the infrastructure and other aspects of support necessary to accomplish the project? Yes, although a −80oC**

	freezer is requested in the budget. This seems quite reasonable, especially given the storage of the large number of clam tissue samples for the feeding studies.
Rating	excellent

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	Yes, it appears to be a reasonable budget, especially given the intensive laboratory studies that will be performed.
Rating	excellent

Overall

Provide a brief explanation of your summary rating.

Comments	Overall, this proposal is very well defined and hypothesis driven. Given the urgency to assess this marsh system since the adjoining marsh is in restoration, this proposal could not have been more timely. The assessment of the bioaccumulation/ biomagnification will be useful, as will be the benthic invertebrate community structure changes along a salinity and contaminant gradient. Linking effects seen in the field to biomarkers and chemical data is also an important step in assessing mechanisms of action. This is an extremely ambitious proposal, but the authors seem capable of performing these tasks.
Rating	excellent